



United States Department of the Interior

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AESO/SE
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February 5, 2018

Memorandum

To: Program Manager, Lower Colorado River Multi-Species Conservation Program,
Bureau of Reclamation, Boulder City, Nevada (LC-8000)

To: Assistant Regional Director, Ecological Services, Albuquerque, NM
(Attn: M. Tuegel)

From: Field Supervisor

Subject: Final Intra-Service Biological Opinion for the Lower Colorado River Multi-Species
Conservation Program – Addition of Northern Mexican Gartersnake (*Thamnophis
eques megalops*) as a Covered Species.

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (Service) under section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). As the lead federal agency, your request for formal consultation for the Bureau Indian Affairs, the National Park Service, the Service, the Bureau of Land Management, and the Western Area Power Administration. dated November 28, 2017, addresses impacts that may result from amending the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) 10(a)1(B) permit to include the northern Mexican gartersnake (*Thamnophis eques megalops*) as a covered species under the program. Analysis completed for inclusion of the northern Mexican gartersnake in this program will also address effects of water and power delivery (river operations); as well as other covered actions included under the LCR MSCP; 2005 LCR MSCP HCP, the 2005 10(a)1(B) permit, and 2005 Biological and Conference Opinion (BCO). Inclusion of the northern Mexican gartersnake in this program will provide the needed conservation actions needed to issue an amendment to the 10(a)1(B) permit. The proposed addition of the northern Mexican gartersnake under the program does not change any covered actions or their impacts to other species covered under the LCR MSCP, but includes conservation that will benefit the gartersnake for the remaining life of the program, until 2055. The Bureau of Reclamation (Reclamation) and the LCR MSCP have determined that implementation of the federal and state covered activities and the amendment to the LCR MSCP may affect, and is likely to adversely affect the northern Mexican gartersnake. Although we expect that individual snakes will be taken, there will be an overall net benefit to the species. We agree with your determination and offer the following Biological Opinion (BO) amendment.

This BO is based on information provided in the 2017 Biological Assessment (BA) amendment, telephone conversations and meetings between staff, and other sources of information found in

the administrative record supporting this BO. All aspects of the proposed action remain the same as described in the 2004 and 2017 BAs. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern. A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

2005	BCO, and 10(a)(1)(B) permit issued for the LCR MSCP
2014	Final rule designating the northern Mexican gartersnake a threatened species under the Act.
2015	Northern Mexican gartersnake detection confirmed at the LCR MSCP's Beal Lake Conservation Area on Havasu National Wildlife Refuge near Needles, California in the Lower Colorado River Reach 3.
June 28, 2017	LCR MSCP Steering Committee passed resolution to amend the program and reinstate consultation with the Service to include the northern Mexican gartersnake.
November 28, 2017	Current 2017 BA amendment finalized and official formal consultation initiated.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The March 4, 2005 BCO and the amended 2017 BA fully describe implementation of the LCR MSCP and is briefly summarized below. Since the covered activities are not changing with the addition of the northern Mexican gartersnake, the conservation plan as outlined in the 2005 LCR MSCP HCP will not change. A portion of the habitat already planned to be created will be managed for the northern Mexican gartersnake; 1,496 acres (i.e., the extent of marsh and cottonwood-willow land cover to be created as habitat for the northern Mexican gartersnake) over the remaining term of the LCR MSCP.

We address the proposed Federal actions in this consultation, which are specific programs or actions on or involving the LCR, undertaken by the six Federal agencies, including Reclamation implementing the Conservation Plan as described in the 2004 BA and 2005 EIS/EIR. The non-Federal action involves amending the LCR MSCP section 10(a)(1)(B) incidental take permit (permit) to include take of the northern Mexican gartersnake from non-Federal actions described in the HCP. As the lead Federal agency, Reclamation requested coverage of its, and the other Federal agencies', actions for the remainder of the LCR MSCP until 2055. The LCR MSCP planning area is shown in Figure 1, and is described below.

The LCR MSCP is a joint effort by Federal and non-Federal (state, local, and private) entities with management authority for storage, delivery, and diversion of water; hydropower generation,

marketing, and delivery; and land management or Native American Trust responsibilities along the LCR, to address regulatory requirements under sections 7, 9, and 10 of the Act for their activities. During the 10-year development of the Conservation Plan for the LCR MSCP, we worked with the Federal and non-Federal agencies to evaluate the effects (and resulting incidental take) of their actions along the LCR and in the LCR MSCP's planning area. Many of these activities, especially those related to water delivery and diversion, are interrelated and interdependent to the extent that separating out the effects of all specific actions and assigning them to a particular Federal or non-Federal agency is not feasible. In this amendment to the combined BCO, the Arizona Ecological Services Office (AESO) will document the intra-Service consultation for our Federal action of issuing an ITP, as well as other Federal agency actions and non-Federal (Permittees) actions involving water diversion, power deliveries, habitat restoration, and related actions by the LCR MSCP. We provide a summary of the non-Federal activities in the full text description in the HCP (LCR MSCP 2004) and relevant appendices. Reclamation is the lead agency for the consultation on the other Federal actions described in the 2004 BA. Reclamation included its discretionary actions within the LCR MSCP planning area and implementation of the Conservation Plan in their request. Western Area Power Administration (Western), the Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), FWS, and National Park Service (NPS) have only included specific portions of their discretionary programs within the LCR MSCP planning area in the request for consultation.

In the standard analysis to determine the amount of incidental take in a section 7 consultation on Federal actions, we determine the amount of take that would occur, and provide reasonable and prudent measures with terms and conditions to minimize the amount of take. Because this is a combined BO and there is no separation of effects and the resulting incidental take for the Federal and non-Federal covered actions, this section 7 consultation will use the standard for reducing incidental take as required for section 10(a)(1)(B) permits with the understanding that this standard does not apply to Federal agencies generally, and only applies to the Federal agencies as described in this BO due to the unique and comprehensive nature of the LCR MSCP.

Conservation Measures

Conservation measures have been proposed for the northern Mexican gartersnake and are fully described in the 2017 HCP Amendment (Attachment 5 and additional text added on page I-29 of Appendix I of the HCP). Many of these conservation measures are in association with conservation measures that also benefit other covered species included in the LCR MSCP. To fit the program document and add clarity to when these conservation measures overlap, we reference existing conservation measures that will also benefit the northern Mexican gartersnake. These conservation measures include;

- 1) To mitigate the effects of the covered activities, conservation measure NMGS1 states that 512 acres of marsh will be created to provide northern Mexican gartersnake habitat. This created habitat will also be habitat for the Yuma Clapper rail (HCP conservation measure CLRA1). Of the 5,940 acres of LCR MSCP-created cottonwood-willow I-IV, 984 acres will be created and managed near marshes to provide northern Mexican gartersnake habitat. Marsh associated with backwaters that are disconnected from the LCR channel are of higher value to the northern Mexican gartersnake than connected backwaters on the LCR and are the preferred type to achieve LCR MSCP conservation goals for this species. Marsh associated with disconnected backwaters are managed to limit non-native

predatory species, to the extent practicable. These small patches of habitat may provide linkages between existing habitat and may facilitate the colonization of created habitats.

- 2) Conservation measure NMGS2 provides for implementation of measures to avoid or minimize take of the northern Mexican gartersnake as provided through LCR MSCP best management practices. These practices will be developed in coordination with the USFWS and may include measures addressing worker education programs, speed limits, seasonal restrictions, backfilling or covering trenches overnight, and effects of non-natives species.
- 3) The following avoidance and minimization measures (AMM) outlined in the HCP also apply to the gartersnake (AMM1, AMM2, AMM4, AMM5, AMM6). These measures are ongoing and will be implemented to benefit the gartersnake except where implementation would negatively affect other covered species. Since the measures are beneficial to all of the covered species, there may be temporary negative impacts that rise to the level of take, but overall will benefit the gartersnake.
- 4) Monitoring and research measure (MRM2) will also occur and focus on the gartersnake.

Implementing the LCR MSCP conservation measures, including creation of 1,496 acres of habitat, achieves the LCR MSCP goal to avoid, minimize, and fully mitigate adverse effects of covered activities on the northern Mexican gartersnake. Implementing these measures will help ensure that the existing population level of the species in the LCR MSCP planning area is maintained as a result of fully replacing affected habitat that otherwise could decline in function or be lost without management intervention. Including the northern Mexican gartersnake for coverage would not increase program costs since the amount of habitat being created for the HCP would not be increasing, and, under Section 10.3 of the Implementing Agreement, we must consider and give full credit for conservation measures under the HCP already being implemented that would benefit species added to the LCR MSCP. In addition, implementing the conservation measures will benefit the northern Mexican gartersnake by increasing the amount of new gartersnake habitat in the LCR MSCP planning area by 269 acres, in addition to replacing the extent of affected gartersnake habitat.

We agree these measures would provide a net benefit to the species potentially affected by more than offsetting potential impacts. The proposed action and resulting conservation measures are designed to provide a conservation benefit for the gartersnake in the action planning area of the LCR MSCP.

ACTION AREA

The LCR MSCP defines the geographical area (the “planning area” in all LCR MSCP documents) as the Colorado River in Arizona, California, and Nevada including the full-pool elevations of lakes Mead, Mohave, and Havasu, and the historical floodplain of the LCR. The historical floodplain is defined as all lands that are or have been affected by the meandering or regulated flows of the Colorado River, which historically have been defined by the change in elevation that forms the adjoining uplands. The planning area includes that part of the Colorado River in the United States between the Northern International Boundary (NIB) (located upstream of Morelos Diversion Dam) and the Southern International Boundary (SIB). For this

consultation, we have determined that the action area is defined as the planning area for the LCR MSCP, as described in the HCP (LCR MSCP 2004).

STATUS OF THE SPECIES

Northern Mexican Gartersnake

Legal Status

The *Federal Register* notice listing the northern Mexican gartersnake as threatened under the Act was published on July 8, 2014 (79 FR 38678a). Please refer to this rule for more in-depth information on the ecology and threats to the species, including references. Critical habitat was proposed on July 10, 2013 (78 FR 41500b) and has not yet been designated. We expect to publish a modified re-proposal for critical habitat and an accompanying Notice of Availability announcing the draft Environmental Assessment and draft Economic Analysis in the future. Details on critical habitat are provided below.

Physical Description

The northern Mexican gartersnake, which reaches up to 44 inches total length, ranges in color from olive to olive-brown or olive-gray with three lighter-colored stripes that run the length of the body, the middle of which darkens towards the tail. It may occur with other native gartersnake species and can be difficult for people without specific expertise to identify because of its similarity of appearance to other native gartersnake species. The position of the lateral strip in the anterior portion of the body is a key diagnostic feature. If this stripe invades the fourth scale row, it is conclusive as a northern Mexican gartersnake.

Habitat and Natural History

Throughout its rangewide distribution (including Mexico), the northern Mexican gartersnake occurs at elevations from 130 to 8,497 ft (Rossman *et al.* 1996, p. 172) and is considered a “terrestrial-aquatic generalist” by Drummond and Marcías-García (1983, pp. 24-26). The northern Mexican gartersnake is often found in riparian habitat, but also displays uniquely terrestrial behaviors, such as hiding under cover in grassland habitat up to a mile away from any surface water (Cogan 2015). Locations of records suggest northern Mexican gartersnakes may use terrestrial habitat at considerable distances from water and may possess a more terrestrial ecology than previously understood (Jones 2017), potentially forging on alternative prey through periods of long(er)-distance dispersal.

The northern Mexican gartersnake is found both in lentic habitat (stock tanks, ponds, cienegas, etc.) or lotic habitat, generally lower-gradient streams. In lotic habitat, Emmons and Nowak (2013) found this subspecies most commonly in protected backwaters, braided side channels and beaver ponds, isolated pools near the river mainstem, and edges of dense emergent vegetation that offered cover and foraging opportunities. Dense vegetation plays a key role in protecting gartersnakes when in the presence of harmful nonnative species (Boyarski *et al.* 2015, p. 19). In semi-developed areas such as the Bubbling Ponds State Fish Hatchery, telemetry research found that aquatic edge habitat is frequently used, flowed by upland habitat (for gestation and periods of dormancy (Boyarski *et al.* 2015, p. 14) and developed areas, with snakes using artificial, human-created objects as surface cover (Boyarski *et al.* 2015, pp. 14, 19).

Emmons and Nowak (2016, pp. 35-41) analyses of microhabitat use by northern Mexican gartersnakes (particularly females) in the Verde Valley, using telemetry, generally showed the species 1) was found in water eight percent of tracked locations while on land 88 percent of tracked locations; 2) disproportionately used habitat within 328 feet of water; 3) favored marshy lagoons and backwaters of other types of aquatic habitat; 4) showed both no distinct preference for water depth or preferred depths shallower than 6 inches; 5) preferred slow or still water and was often associated with beaver ponds; 6) favored south, east, and southwest-facing slopes; 7) showed no distinct preference for flat, mild, or moderate slope severity; 8) was strongly associated with locations with over 76 percent ground cover; and, 9) was not strongly associated with any particular percentage of canopy cover. Habitat types used by northern Mexican gartersnakes in lower Tonto Creek included aquatic edge, dead tree floodplain, dry edge, meadow, riparian floodplain, dead tree floodplain, dry marsh, riparian woodland, aquatic wetland, dry wetland, shrub floodplain, and arid uplands (Mryand *et al.* 2017, pp. 9-10). Sprague (2017, pp. 17-18, 32-33) found that habitat selection was most distinct during the active, gestation, and inactive seasons, "... sites close to water with dense vegetative cover for thermoregulation and predator avoidance are important during the active season. Adjacent open or less-densely vegetated areas for basking are beneficial during the active and gestation seasons. Rocky slopes that offer a mix of open and closed tree or shrub canopy are necessary for the inactive season."

Home range or territory size of the northern Mexican gartersnake can vary depending on sex, habitat characteristics, and prey resources. Boyarski *et al.* (2015, p. 12) calculated a mean home range of 6.2 acres (1.7 ac – 10.4 ac) at the Bubbling Ponds State Fish Hatchery while Emmons and Nowak (2016, p. 24) calculated a mean home range size of 8.6 ac in the Verde Valley of Arizona. In a population studied along lower Tonto Creek, home ranges for 10 telemetered northern Mexican gartersnakes ranged from 0.16 – 10.8 ac (Myrand *et al.* 2017, p. 8). Home ranges can also be as large as 41.3 acres but such large home ranges are considered unusual (Emmons and Nowak 2016, p. 24). It should also be noted that habitat use and seasonal movement patterns can vary significantly within snake species or within neighboring groups of individuals (Gomez *et al.* 2015, p. 373).

The northern Mexican gartersnake is largely diurnal but may be found active at night, especially if daytime highs meet or exceed 95°F (Sprague 2017, pp. 18, 29). Like most snakes, it spends comparatively little time moving and visible on the surface (Sprague 2017, p. 26) but can be surface active any month of the year depending on elevation and behavior with longer and more frequent movements during the warmer months and shorter, less frequent movements during the cooler months (Boyarski *et al.* 2015, p. 14). Surface movements can also be expected during the coldest months of the year when dormancy is generally expected but they are usually of short distance (Boyarski *et al.* 2015, p. 14; Emmons and Nowak 2016, p. 30). Telemetry research suggests that surface activity is most likely to occur when nighttime low temperatures exceed 32°F (Emmons *et al.* 2016a), but such movements are not expected to be extensive.

Northern Mexican gartersnakes do not "hibernate" in the classic use of the term but rather have seasonal fluctuations in levels of surface activity (Sprague 2017, pp. 23, 28) which may include periods of extended inactivity disrupted by occasional surface movements between retreats used (Emmons and Nowak 2016, p. 47). This behavior may be an adaptation to living in habitat with dynamic fluctuations in water levels during winter and early spring. During periods of winter

dormancy, northern Mexican gartersnakes may use rodent burrows, cavities below boulder/talus fields, cavities under human-made and natural debris piles as cover in a variety of habitat types including riparian woodland near aquatic edges, meadows, open floodplains, and upland mesquite bosques (Emmons and Nowak 2016, p. 30). These sites may be near the waters' edge or over 500 feet away or more from water (Emmons and Nowak 2016, p. 30, Sprague 2017, p. 26).

The northern Mexican gartersnake is an active predator and is thought to heavily depend upon a native prey base (Rosen and Schwalbe 1988). Northern Mexican gartersnakes forage along vegetated streambanks, searching for prey in water and on land, using different strategies (Alfaro 2002). Primarily, its diet consists of amphibians and fishes, such as adult and larval (tadpoles) native leopard frogs, as well as juvenile and adult native fish (Rosen and Schwalbe 1988), but earthworms, leeches, lizards, and small mammals are also taken. Manjerrez *et al.* (2017, entire) sampled stomach contents from 262 Mexican gartersnakes across 23 discreet locations along the Mexican Plateau from 1980-1995. Fish (42.4 percent) were consumed most frequently followed by leeches (23.7 percent), earthworms (10.6 percent), frogs (10.2 percent) and tadpoles (9.8 percent); remaining prey items included slugs, axolotl (Mexican salamander (*Ambystoma mexicanum*), lizards, and mice) (Manjerrez *et al.* 2017). Some populations may specialize on available prey such as spadefoot toads (*Scaphiopus couchii*; d'Orgeix *et al.* 2013, entire) or Woodhouse's toads (*Anaxyrus woodhousii*; Myrand *et al.* 2017, p. 8). In situations where native prey species are rare or absent, this snake's diet may include nonnative species, including larval and juvenile bullfrogs, western mosquitofish (*Gambusia affinis*; Holycross *et al.* 2006, Emmons and Nowak 2013), or other nonnative fishes. In some cases where the aquatic community is nearly wholly nonnative, small size classes of harmful nonnative species (excluding crayfish) may become an important substitute for native prey (Emmons *et al.* 2016b, entire). Western mosquitofish in particular may be less-preferred as compared to anuran prey (Emmons and Nowak 2016b). In northern Mexican gartersnake populations where the aquatic community base is skewed heavily towards harmful nonnative species, recruitment of gartersnakes is often diminished or nearly absent.

Natural predators of the northern Mexican gartersnake may include vertebrates such as birds of prey, other snakes, wading birds, mergansers, belted kingfishers, raccoons, skunks, and coyotes (Rosen and Schwalbe 1988, Brennan *et al.* 2009; Emmons *et al.* 2016a, entire). Invertebrates, such as diving beetles have also been documented preying upon gartersnakes (Drummond and Macias Garcia 1983, entire). Historically, large, highly predatory native fish species such as Colorado pikeminnow (*Ptychocheilus lucius*) may have preyed upon northern Mexican gartersnakes where they co-occurred. Native chubs in their largest size class may also prey on neonatal gartersnakes, but has not been confirmed in the literature or through field observation.

Sexual maturity in northern Mexican gartersnakes occurs at two years of age in males and at two to three years of age in females (Rosen and Schwalbe 1988). Northern Mexican gartersnakes are viviparous (bringing forth living young rather than eggs). Mating has been documented in April and May followed by the live birth of between 7 and 38 newborns in July and August (Rosen and Schwalbe 1988, Nowak and Boyarski 2012).

Factors Associated with Population Declines and Range Contraction

The best available commercial and scientific information confirms that harmful nonnative species such as bass (*Micropterus* sp.), flathead catfish (*Pylodictis* sp.), channel catfish (*Ictalurus* sp.), bullheads (*Ameiurus* sp.), sunfish (*Lepomis* sp.), crappie (*Pomoxis* sp.), brown trout (*Salmo trutta*), American bullfrogs (*Lithobates catesbeiana*), and crayfish (northern (virile) crayfish (*Orconectes virilis*) and red swamp crayfish (*Procambarus clarkii*) are the most significant threat to northern Mexican gartersnakes and their prey bases, and have had a profound role in their rangewide decline. Harmful nonnative fish and bullfrogs affect gartersnake populations via direct and indirect community interactions whereas crayfish also affect gartersnakes via effects to their physical habitat in addition to via adverse community interactions (Gonçalves Loureiro *et al.* 2015, p. 10). Crayfish can be particularly difficult to eradicate once established. Biological, chemical, mechanical, physical, biocidal, autocidal, and legislative control methods have been used for crayfish control around the world but each come with environmental costs that can outweigh benefits and no single method has proven both effective and efficient (Stebbing *et al.* 2014, entire; Gonçalves Loureiro *et al.* 2015, p. 11).

The effect of these harmful nonnatives on the native aquatic community is broad, and should be treated as a landscape-scale threat to biodiversity. For example, in 2014, Timmons *et al.* (2015, entire) conducted fish surveys at 65 different sites within the Gila River basin. They concluded that of approximately 46 of the sites sampled, nonnative fish were a primary threat to the native fish community; often seconded by drought or crayfish.

In addition to risking physical injury from the dorsal or pectoral spines of harmful nonnative fish while attempting to ingest them (Figure 3 in Emmons *et al.* 2016b), complex ecological interactions between these harmful nonnative species and the native aquatic community have resulted in direct predation on gartersnakes; shifts in biotic community structure from largely native to largely nonnative; and competition for a diminished gartersnake prey base that can ultimately result in the injury, starvation, or death of individual gartersnakes followed by reduced recruitment within populations, subsequent population declines, and ultimately local and regional extirpations. Native aquatic communities that serve as the prey base for northern Mexican gartersnakes have been severely affected by harmful nonnative species such that native aquatic ecosystems are on the verge of collapse in many regions, as documented by multiple listings of native fish species of the southwestern United States and by a large body of literature over several decades (Meffe 1985; Propst *et al.* 1988; Rosen and Schwalbe 1988; Douglas *et al.* 1994; Degenhardt *et al.* 1996; Fernandez and Rosen 1996; Richter *et al.* 1997; Inman *et al.* 1998; Rinne *et al.* 1998; Nowak and Santana-Bendix 2002; Propst 2002; Desert Fishes Team 2003; 2004; Bonar *et al.* 2004; Rinne 2004; Fagan *et al.* 2005; Knapp 2005; Turner 2007; Holycross *et al.* 2006; Brennan 2007; Propst *et al.* 2008; Brennan and Rosen 2009; Minckley and Marsh 2009; Pilger *et al.* 2010; Stefferud *et al.* 2011).

Effects of climate change in the southwestern United States are predicted to benefit harmful nonnatives over native aquatic species. According to modeling results reported by Jaeger *et al.* (2014, entire) climate change is expected to affect southwestern streams by increasing the number of zero-flow days, the number of zero-flow periods, and the duration of zero-flow periods which will concentrate fish populations and exacerbate community-level effects of harmful nonnative from increased competition and predation.

Activities that reduce flows or dewater habitat, such as dams and diversions (Ligon *et al.* 1995; Turner and List 2007), flood-control projects, and groundwater pumping (Stromberg *et al.* 1996; Rinne *et al.* 1998; Voeltz 2002; Haney *et al.* 2009; USGS 2013), seriously threaten the physical habitat of the gartersnakes and are second only to harmful nonnative species in their scope and magnitude of effect on the northern Mexican gartersnake because their primary prey species must have water to survive and without this prey base, northern Mexican gartersnakes will not persist. Dams, diversions, and other structures alter the timing, duration, intensity, and frequency of flood events which favors harmful nonnative species and leads to unfavorable shifts in entire fish communities (Rinne *et al.* 1998; Propst *et al.* 2008) which compounds their effect on gartersnake populations. Even without these factors, reservoirs promote harmful nonnative fish communities downstream of dams regardless of whether dam construction results in any changes to thermal regimes or downstream flow (Martinez *et al.* 1994, entire). Human population growth has resulted in increased water demands and exacerbated the magnitude and scope of these effects on gartersnake populations.

Many other factors have contributed to the decline of the northern Mexican gartersnake, and in some cases, continue to present a significant threat to low-density populations through synergistic mechanisms, including: climate change and drought (IPCC 2007; Seager *et al.* 2007; Overpeck 2008); development and recreation within riparian corridors (Briggs 1996, Ernst and Zug 1996, Green 1997, Wheeler *et al.* 2005, Paradzick *et al.* 2006); indirect effects from fisheries management activities (Dawson and Kolar 2003, Carpenter and Terrell 2005, Holycross *et al.* 2006, Finlayson *et al.* 2010); road construction, use, and maintenance (Klauber 1956, Waters 1995, Shine *et al.* 2004, Ouren *et al.* 2007, Breiningen *et al.* 2012); adverse human interactions with gartersnakes (Fleharty 1967, Green 1997, Nowak and Santana-Bendix 2002, Hibbitts and Fitzgerald 2005); environmental contaminants (Hopkins *et al.* 1999, Campbell *et al.* 2005, Rainwater *et al.* 2005, Wylie *et al.* 2009); and mortality from entanglement hazards such as erosion control products (Stuart *et al.* 2001, Barton and Kinkead 2005, Kapfer and Paloski 2011, Barragán-Ramírez and Ascencio-Arrayga 2013, NMDGF 2013).

For a detailed analysis on the status of and threats to the northern Mexican gartersnake, please review the proposed listing rule (78 FR 41500).

Population Genetics

Wood (2015) used multiple genetic markers to determine genetic structure among northern Mexican gartersnake populations within different subbasins to assess levels of genetic diversity and gene flow within and among them. Preliminary results found at least five distinct genetic lineages exist for northern Mexican gartersnakes within the United States. Specifically, population differentiation was observed between populations in the following subbasins: Bill Williams River, Verde River, Tonto Creek, Upper Santa Cruz, and the Upper San Francisco/Gila Rivers.

Historical Distribution

The northern Mexican gartersnake historically occurred in every county and nearly every subbasin within Arizona, from several perennial or intermittent creeks, streams, and rivers as well as lentic wetlands such as cienegas, ponds, or stock tanks (Rosen and Schwalbe 1988, Rosen *et al.* 2001; Holycross *et al.* 2006). In New Mexico, the gartersnake had a limited

distribution that consisted of scattered locations throughout the Upper Gila River watershed in Grant and western Hidalgo Counties (Price 1980, Fitzgerald 1986, Degenhardt *et al.* 1996, Holycross *et al.* 2006). Within Mexico, northern Mexican gartersnakes historically occurred within the Sierra Madre Occidental and the Mexican Plateau, comprising approximately 85 percent of the total rangewide distribution of the subspecies (Rossman *et al.* 1996).

Current Distribution and Population Status in the United States

The only viable northern Mexican gartersnake populations in the United States where the subspecies remains reliably detected are all in Arizona: 1) The Page Springs and Bubbling Ponds State Fish Hatcheries along Oak Creek; 2) lower Tonto Creek; 3) the upper Santa Cruz River in the San Rafael Valley; 4) the Bill Williams River; and, 5) the middle/upper Verde River. In New Mexico and elsewhere in Arizona, the northern Mexican gartersnake may occur in extremely low population densities within its historical distribution; limited survey effort is inconclusive to determine extirpation of this highly secretive species. The status of the northern Mexican gartersnake on tribal lands, such as those owned by the White Mountain or San Carlos Apache Tribes, is poorly understood. Less is known about the current distribution of the northern Mexican gartersnake in Mexico due to limited surveys and limited access to information on survey efforts and field data from Mexico.

We have concluded that in as many as 23 of 33 known localities in the United States (70 percent), the northern Mexican gartersnake population is likely not viable and may exist at low population densities that could be threatened with extirpation or may already be extirpated. Only five populations of northern Mexican gartersnakes in the United States are considered likely viable where the species remains reliably detected.

Current population status of the northern Mexican gartersnake in the United States

Row	Location	Last Record	Suitable Physical Habitat Present	Native Prey Species Present	Harmful Nonnative Species Present	Predicted Population Status
1	Gila River (NM, AZ)	2013	Yes	Yes	Yes	Likely low density
2	Spring Canyon (NM)	1937	Yes	Possible	Likely	Likely extirpated
3	Mule Creek (NM)	1983	Yes	Yes	Yes	Likely low density
4	Mimbres River (NM)	Likely early 1900s	Yes	Yes	Yes	Likely extirpated
5	Lower Colorado River (AZ)	2015	Yes	Yes	Yes	Likely low density
6	Bill Williams River (AZ)	2012	Yes	Yes	Yes	Likely viable
7	Big Sandy River (AZ)	2016	Yes	Yes	Likely	Likely low density
8	Santa Maria River (AZ)	2016	Yes	Yes	Likely	Likely low density
9	Agua Fria River (AZ)	1986	Yes	Yes	Yes	Likely low density
10	Little Ash Creek (AZ)	1992	Yes	Yes	Yes	Likely low density
11	Lower Salt River (AZ)	1964	Yes	Yes	Yes	Likely extirpated
12	Black River (AZ)	1982	Yes	Yes	Yes	Likely low density
13	Big Bonito Creek (AZ)	1986	Yes	Yes	Yes	Likely low density
14	Tonto Creek (AZ)	2005	Yes	Yes	Yes	Likely viable
15	Upper /Middle Verde River (AZ)	2012	Yes	Yes	Yes	Likely viable
16	Oak Creek (AZ) (Page Springs and Bubbling Ponds State Fish Hatcheries)	2015	Yes	Yes	Yes	Likely viable
17	Spring Creek (AZ)	2014	Yes	Yes	Yes	Likely low density
18	Sycamore Creek (Yavapai/Coconino Co., AZ)	1954	Yes	Possible	Yes	Likely extirpated
19	Upper Santa Cruz River/San Rafael Valley (AZ)	2015	Yes	Yes	Yes	Likely viable
20	Redrock Canyon/Cott Drainage	2008	Yes	Yes	Yes	Likely low

	(AZ)					density
21	Sonoita Creek (AZ)	2013	Yes	Possible	Yes	Likely low density
22	Scotia Canyon (AZ)	2009	Yes	Yes	No	Likely low density
23	Parker Canyon (AZ)	1986	Yes	Possible	Yes	Likely low density
24	Las Cienegas National Conservation Area and Cienega Creek Natural Preserve (AZ)	2015	Yes	Yes	No	Likely low density
25	Lower Santa Cruz River (AZ)	1956	Yes	Yes	Yes	Likely extirpated
26	Buenos Aires National Wildlife Refuge (AZ)	2000	Yes	Yes	Yes	Likely low density
27	Brown Canyon (AZ)	2014	Yes	Yes	No	Likely low density
28	Fort Huachuca (AZ)	1994	Yes	Yes	Yes	Likely low density
29	Bear Creek (AZ)	1987	Yes	Yes	Yes	Likely low density
30	San Pedro River (AZ)	2007	Yes	Yes	Yes	Likely low density
31	Babocomari River and Cienega (AZ)	1986	Yes	Possible	Yes	Likely low density
32	Canelo Hills-Sonoita Grasslands Area (AZ)	2014	Yes	Yes	Yes	Likely low density
33	San Bernardino National Wildlife Refuge (AZ)	2005	Yes	Yes	Yes	Likely low density

Notes: “Possible” means there were no conclusive data found. “Likely extirpated” means the last record for an area pre-dated 1980, and existing threats suggest the species is likely extirpated. “Likely low density” means there is a post-1980 record for the species, it is not reliably found with minimal to moderate survey effort, and threats exist which suggest the population may be low density or could be extirpated, but there is insufficient evidence to support extirpation. “Likely viable” means that the species is reliably found with minimal to moderate survey effort, and the population is generally considered to be somewhat resilient.

Last updated: 2-2016

Table 1: Current, predicted population status of the northern Mexican gartersnake in the United States.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the species and potential habitat within the action area

At the time the LCR MSCP was established in 2005, the northern Mexican gartersnake was considered extirpated from the area surrounding the main stem of the LCR and had not been considered as a potential covered species. The species was re-documented in 2012 below Alamo Dam on the Bill Williams River and later in its largest tributaries. In 2015, it was documented on the Havasu National Wildlife Refuge within Beal Lake Conservation Area in Mohave County, Arizona

Lower Colorado River—Three records from the late 1800s-early 1900s and a fourth from 2015 document northern Mexican gartersnakes from the Colorado River where they were likely broadly distributed along its course prior to area settlement. We are not aware of any surveys specifically conducted for northern Mexican gartersnakes along the lower Colorado River in modern history, largely because they were considered likely extirpated there for decades due to significant habitat alteration, channelization, and the introduction of harmful nonnative species (Ohmart *et al.* 1988, Rosen and Schwalbe 1988). Vitt and Ohmart (1978) conducted a general reptile and amphibian inventory along the lower Colorado River that consisted of visual searches on foot and by vehicle and found no northern Mexican gartersnakes; no trapping was performed. Bullfrogs are considered abundant throughout the lower Colorado River which likely led to the suspected extirpation of native leopard frogs that were once widespread there (Vitt and Ohmart 1978, Clarkson and DeVos 1986, Ohmart *et al.* 1988). Crayfish are also abundant along the lower Colorado River (Ohmart *et al.* 1988, Inman *et al.* 1998) and are commonly found in the stomachs of bullfrogs (Clarkson and DeVos 1986). Forty-four species of nonnative fish are known from the Colorado River in high abundance and native fish species have declined precipitously (Ohmart *et al.* 1988, Minckley *et al.* 2003). Northern Mexican gartersnakes may immigrate to the lower Colorado River from occupied habitat in the Bill Williams River, but fisheries management policies in the mainstem Colorado, the abundance of harmful nonnative species, and significant habitat alteration along the lower Colorado River would likely prohibit the reestablishment of a robust northern Mexican gartersnake population in the lower Colorado River. We consider this population as likely low density.

Colorado River Subbasin: Lower Colorado River (Arizona)			
Record Year	Locality Descriptor	Reference	Notes
1889	Yuma	Rosen and Schwalbe 1988, Appendix I;	140 ft elevation – low elevation record for Arizona (possibly rangewide)
1890	Yuma		
1904	ca. Fort Mohave	Holycross <i>et al.</i> 2006, Appendix A	
2015	Havasus NWR	Cotten 2015	BLCA; single adult. Potentially, same individual observed on two occasions in the same area.
Predicted Population Status: Likely low density			

Table 2. Colorado River detections.

Bill Williams River—Prior to 2012, there were no records of northern Mexican gartersnakes from the Bill Williams River. In 2012, a total of ten records were obtained; the first, an incidental capture during another research project. We are not aware of any targeted surveys for northern Mexican gartersnakes that have occurred in this system. Blair (2012, pers. comm.) provided a cumulative list of fish species known to occur in the Bill Williams River that includes many species of native and nonnative fishes. Our knowledge of the aquatic community in Bill Williams River suggests that it once supported an almost wholly native fish community that collapsed due to the increased presence of nonnative fish after the construction of the Alamo Lake Dam, which stabilized flows and provided an advantage to nonnative species (Pool and Olden 2014 *In press*). Eleven nonnative fish species have been reported from the Bill Williams River (Pool and Olden 2014 *In press*). Upstream, in Alamo Lake, the fish community is largely made-up of predatory nonnative fish, with largemouth bass comprising the highest numbers, followed by yellow bullhead, channel catfish, and black crappie in no specific order (USFWS 2011). Crayfish are known as abundant in the Bill Williams River and nonnative, predatory fish predominate currently, but bullfrogs curiously appear to be absent. Lowland leopard frogs are present in various densities and likely serve as the primary prey species for northern Mexican gartersnakes in the Bill Williams River. As of 2008, Anderson and Shafroth (2010) estimated that 92 beaver dams were present on the river, adding that an estimated 3–4 percent of the river is converted from lotic (flowing water) to lentic (still water) habitat annually when significant flooding does not occur. The creation of pool habitat from beaver dam activity, combined with the existing dense cover found in the riparian corridor, and abundant backwaters along the Bill Williams River, likely benefits the northern Mexican gartersnake by providing excellent foraging conditions and protective cover from nonnative predation. However, beaver dams also provide suitable habitat for harmful nonnative species. The 2012 records and the relative ease of acquiring them suggest the northern Mexican gartersnake is likely viable in the Bill Williams River.

Colorado River Subbasin: Bill Williams River (Arizona)			
Record Year	Locality Descriptor	Reference	Notes
2012	ca. 14 mi E of Hwy 95 crossing of Bill Williams River	Jones 2012a, pers. comm.; Cotton <i>et al.</i> 2013, p. 111	Adult female captured and drowned in a funnel trap used in leopard frog survey. First record for this drainage.
2012	ca. 14 mi E of Hwy 95 crossing of Bill Williams River	Jones 2012b, pers. comm.	Additional nine individuals captured and released alive.
Predicted Population Status: Likely viable			

Table 3. Bill Williams River detections.

In the spring of 2015, the LCR MSCP was notified by Great Basin Bird Observatory that they may have sighted a northern Mexican gartersnake at Beal Lake Conservation Area on the Havasu National Wildlife Refuge in Arizona during riparian bird monitoring. Arizona Game and Fish Department, the Service, and U.S. Geological Survey were notified and five photographs were provided for identification. A gartersnake was observed on May 4, 2015, in the same area and two additional photographs were taken for identification. We notified the LCR MSCP on June 1, 2015, that the species was confirmed as a northern Mexican gartersnake by Taylor Cotten and Tom Jones of AGFD and Jeff Servoss of the Service. Northern Mexican gartersnake distribution and abundance within the LCR is not well known at this time.

Food Availability within the LCR MSCP planning area

Potential prey along the Colorado River mainstem are native amphibians such as the Woodhouse's toad), Great Plains toad (*Anaxyrus cognatus*), and Pacific tree frog (*Hyla regilla*) (Cotten 2011, Cotten and Grandmaison 2012, Rorabaugh et al. 2004). The northern Mexican gartersnake will also prey on non-native American bullfrog metamorphosed juveniles and tadpoles (*Lithobates catesbeianus*) and juvenile non-native fish (Emmons and Nowak 2013, Holm and Lowe 1995). The northern Mexican gartersnake will also prey upon invertebrates (earthworms, leeches, etc.), lizards (*Sceloporus* and *Apsidoscelis* spp.), and small mammals (Holm and Lowe 1995, Rosen and Schwalbe 1988). The following species of small mammals have been detected on LCR MSCP conservation areas: cactus mouse (*Peromyscus eremicus*), deer mouse (*Peromyscus maniculatus*), desert pocket mouse (*Chaetodipus penicillatus*), house mouse (*Mus musculus*), southern grasshopper mouse (*Onychomys torridus*), Merriam's kangaroo rat (*Dipodomys merriami*), white-throated wood rat (*Neotoma albigula*), and the Colorado River cotton rat (*Sigmodon arizonae*).

Breeding Season and Habitat

Nowak et al. (2011) thought that open shallow water adjacent to dense emergent and/or submergent vegetation may be important for breeding activities. Female northern Mexican gartersnakes bear young in warm microenvironments that meet thermoregulatory needs, including rock walls, the ground, and sun-warmed sacaton tussocks (Rosen and Schwalbe 1988).

The breeding season in this area is estimated to occur between March and July (March-May mating; May-August live birth).

Due to the low elevation and corresponding mild winter temperatures along the Colorado River mainstem and surrounding area (rarely below freezing for long periods of time), northern Mexican gartersnakes likely exhibit more surface activity during the winter months compared to populations that occur at higher elevation. Supporting evidence for differences in activity related to temperature comes from preliminary findings from telemetry research along the Verde River (Emmons and Nowak 2016), Oak Creek (Sprague 2017), Tonto Creek (Myrand *et al.* 2017), and incidental reports and observations.

Overall Habitat Potential Determination

Based on the information provided above, the LCR MSCP estimates the habitat areas with a high potential for occurrences of northern Mexican gartersnakes during the active season include the created marsh, 30 meter buffer at the water's edge (15 m in water and 15 m into riparian), and the emergent vegetation. Areas with a moderate potential for occurrences of gartersnakes year-long include the existing riparian habitat and the created riparian habitat. Areas with a low potential for occurrences of gartersnakes include the sparsely vegetated upland habitat with dry, sandy soils.

Factors affecting species' environment within the action area

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. The effects of all LCR MSCP covered actions were considered and are briefly summarized below.

Effects to northern Mexican gartersnake

Flow Related Effects

The potential effects of implementing covered activities and LCR MSCP conservation measures on the rangewide distribution and status of the northern Mexican gartersnake are expected to be minor, affecting a relatively small number of individuals and proportion of its habitat throughout its range over the remaining term of the LCR MSCP. The LCR MSCP Conservation Plan includes conservation measures to avoid and minimize direct effects of implementing covered activities on the northern Mexican gartersnake, and the potential effects of habitat loss. These losses are expected to be minimized with the creation of replacement habitat.

Flow-related activities may result in take of the northern Mexican gartersnake. Changes in points of diversion in Reaches 3-5 will lower groundwater levels sufficiently in these reaches to reduce

the extent of 1,081 acres of habitat provided by marshes associated with backwaters and adjacent cottonwood-willow. Reservoir elevations in Reaches 3-5 would not be affected by lower river stage elevations beyond what was anticipated in the BCO. Consequently, flow-related activities are not expected to further affect habitat associated with marshes maintained by reservoirs (e.g., Bill Williams Delta (Reach 3) or that are managed to support marsh vegetation (e.g., Imperial NWR (Reach 5)). Through implementation of AMM2, the LCR MSCP will mitigate potential effects of lowering groundwater elevations on an additional 149 (16 acres of marsh and a maximum of 133 acres of cottonwood-willow) acres of habitat at Topock Marsh by maintaining water deliveries to Topock Marsh for maintenance of water levels and existing habitat conditions. Lowering groundwater elevations could cause direct loss of these habitats through desiccation, fragmentation, or reduction in the extent of habitat patches.

Implementing flow-related covered activities may affect marsh vegetation and adjacent cottonwood-willow that provides northern Mexican gartersnake habitat that periodically establish at inflow points of Lake Mead (e.g., Colorado River delta, Virgin River delta, Muddy River delta) when Lake Mead water surface elevations are below full pool. Marsh habitat below the full pool elevation will be created and lost based on water surface elevations. For example, marsh vegetation established at a certain elevation may be lost if the water surface elevation declines so that groundwater elevations drop below the rooting depths of emergent vegetation. Alternatively, established marsh vegetation would be inundated and lost during wetter periods, when Lake Mead reservoir elevations rise. The frequency, extent, and value of habitat and attendant species benefits that could be periodically created and subsequently lost as a result of changes in reservoir elevations over the term of the LCR MSCP cannot be predicted based on the available information. The periodic loss of these ephemeral marshes, however, could result in a low level of take of the northern Mexican gartersnake over the term of the LCR MSCP.

Effects of ongoing flow-related covered activities could contribute to a minimal and unquantifiable level of degradation of marshes that provide habitat over the term of the LCR MSCP. We expect these effects to be mitigated to some extent by the northern Mexican gartersnakes' demonstrated ability to move about the landscape to exploit ephemeral water sources and associated amphibian breeding events (d'Orgeix *et al.* 2013).

Non-flow Related Effects

Federal

Operation of equipment to implement non-flow-related covered activities (e.g., implementation of channel, desilting basin, boat ramp, gage station, and other facility maintenance activities; implementation of marsh and riparian restoration and maintenance projects; conversion of lands to agriculture) may result in injuries or fatalities of northern Mexican gartersnakes. Effects may include displacement or decreased reproductive success. These activities are expected to result in some low level of take over the term of the LCR MSCP.

Up to 96 acres of northern Mexican gartersnake habitat could be removed to maintain channel functions (e.g. dredging desilting basins) (see Table 5-5 2004 LCR MSCP BA). Activities associated with removal of habitat during the breeding season could result in fatalities of adults or young. These activities are expected to result in some low level of take over the term of the LCR MSCP. As described in Section 5.2.2.3 of the 2004 LCR MSCP BA, indirect effects of

ongoing non-flow-related covered activities could contribute to a minimal and unquantifiable level of degradation of marshes that provide habitat over the term of the LCR MSCP.

The creation of northern Mexican gartersnake habitat through implementation of the LCR MSCP Conservation Plan is expected to result in an increase in the numbers and distribution of northern Mexican gartersnakes in the LCR MSCP planning area. Consequently, the number of northern Mexican gartersnakes exposed to disturbances caused by these types of non-flow related activities is expected to increase in future years.

Non-Federal

Proposed activities related to habitat restoration, maintenance projects, and facilities and infrastructure maintenance, may result in take of the northern Mexican gartersnake. The likelihood for take is expected to increase over the term of the LCR MSCP if the abundance of the northern Mexican gartersnake increases in the LCR MSCP planning area as a result of implementing LCR MSCP conservation measures for this species. Restoration-related activities that effect surface habitat, such as operation of equipment to remove vegetation, could result in temporary or permanent loss of habitat and harassment or mortality of individuals. These activities, however, would be conducted, when possible, when individuals are least likely to be active on the ground surface. Restoration-related activities that effect sub-surface habitat or potential cover sites (ground-disturbing projects with heavy equipment, etc.), would be conducted during the times of year when individuals are most likely to be surface active and can move out of harm's way. Effects on habitat would be temporary for restoration projects that restore or improve existing northern Mexican gartersnake habitat. The probability for permanent loss of habitat is considered minimal because restoration projects undertaken in existing northern Mexican gartersnake habitat will be designed to maintain or improve its habitat, and it is unlikely that state fish and wildlife agencies would remove northern Mexican gartersnake habitat to restore habitat for other species. However, because habitat restoration sites have not yet been identified, it is assumed that up to 10 acres of degraded or former marsh and up to 10 acres of degraded cotton-wood willow land cover that provides low-value habitat could be removed over the term of the LCR MSCP to restore habitat for other species.

Activities associated with maintaining facilities and infrastructure may result in the periodic removal of emergent vegetation growing in canals and drains that may provide northern Mexican gartersnake habitat. Up to 557 miles of canals and drains that could support some patches of emergent vegetation could be subject to periodic maintenance activities that would remove emergent vegetation over the term of the LCR MSCP. As described in Section 4.2.3.1 of the 2005 HCP, it is unlikely that maintenance of canals would measurably affect the extent of the species' habitat. Periodic maintenance of the 244 miles of drains in the LCR MSCP planning area, however, could result in the removal of up to 30 acres of emergent vegetation that could otherwise provide habitat.

LCR MSCP Implementation Effects

Activities associated with creating and maintaining habitat for covered species may result in take of the northern Mexican gartersnake. LCR MSCP habitat-creation-related activities could result in temporary disturbance of habitat and harassment of individuals if they are present at the time activities are implemented, but these activities will avoid removal of primary habitat to establish

habitat for other covered species. Up to 512 acres of existing degraded or former marsh that may provide low-value habitat could be converted to fully functioning marsh that provides high-value northern Mexican gartersnake habitat. Some additional limited and low-value (e.g., dry patches of herbaceous vegetation near marsh edges) could be converted to habitat to benefit other covered species; however, with implementation of the AMM's described in Section 5.6.1 of the 2005 HCP's, "Avoidance and Minimization Measures," removal of these low-quality habitats is not expected to result in measurable harm (i.e., injury or mortality of individuals) and, therefore, take of the northern Mexican gartersnake.

Habitat-management-related activities, such as operation of equipment to remove vegetation and maintain open water in backwaters, burning decadent marsh vegetation to stimulate vegetation growth, periodic removal of trees in patches of created habitat to encourage stand regeneration, and operation of equipment to maintain roads, could result in temporary loss of habitat and harassment, injury, or mortality of individuals. The maximum extent of habitat that could be affected by habitat-management activities is estimated to be 1,496 acres (i.e., the extent of marsh and cottonwood-willow land cover to be created as habitat for associated covered species) over the term of the LCR MSCP. The likelihood for take is expected to increase over the term of the LCR MSCP if the abundance of the northern Mexican gartersnake increases in the LCR MSCP planning area as a result of implementing LCR MSCP conservation measures for this species. The level of adverse effects on habitats and individuals will depend on the type and extent of LCR MSCP habitat management activities that are undertaken in this species' habitat.

Overall Consideration

The covered activities have not changed with the addition of the northern Mexican gartersnake and the conservation plan as outlined in the HCP will not change. A portion of the habitat already planned to be created will be managed for the gartersnake. The amount of northern Mexican gartersnake habitat that will be destroyed or impacted by the covered activities is 1,227 acres. Northern Mexican gartersnake habitat consists of the combination of marsh and adjacent cottonwood-willow land cover types. Therefore, a total of 512 acres of marsh and 984 acres of cottonwood-willow located near marsh; or 1,496 acres will be managed for the northern Mexican gartersnake.

To calculate the impacts for the riparian buffer and to be sure that the impact analysis was consistent, the LCR vegetation layer, from the 1997 vegetation mapping from the original impact analysis, was used. A 600-foot buffer was generated around each marsh expected to be affected by covered activities in Reaches 3, 4, and 5. These buffers were then intersected with all cottonwood-willow vegetation polygons in the vegetation layers. Whole cottonwood-willow polygons were not included, just the resultant intersecting area between the 600-foot marsh buffers and the cottonwood-willow polygons. All analysis and calculations were consistent with the original program design.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require

separate consultation pursuant to section 7 of the Act. The anticipated cumulative effects are the same as the 2005 BCO.

The 2004 BA contains an analysis of the types of future non-Federal actions that may have cumulative effects to covered species and their habitats in the action area. This information is incorporated by reference. These actions are generally related to increasing the human population of the action area, with subsequent increases in economic development, recreation and visitation (including risks of accidental or intentional non-native species introduction and human-caused wildfire), and introduction of environmental contaminants. Because of the long-term nature of this consultation, most of the specific actions that may have cumulative effects have not been identified; however, the general types of effects have been identified in the 2005 BCO.

CONCLUSION

After reviewing the current status of the northern Mexican gartersnake, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our opinion that the proposed action; including ongoing covered activities, implementing the LCR MSCP, and issuing an amendment to the 10(a)(1)(B) permit is not likely to jeopardize the continued existence of the northern Mexican gartersnake. Although a number of individual gartersnakes may be taken directly or adversely affected by harassment or harm this is not anticipated to result in population level impacts to the northern Mexican gartersnake in this area at this time and are not expected to appreciably diminish conservation or recovery of this species throughout its binational distribution.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(a)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and we must undertake them so that they become binding conditions of any grant or permit we issue, as appropriate, for the exemption in section 7(a)(2) to apply. We have a continuing duty to regulate the activity covered by this incidental take statement. If we (1) fail to assume and implement the terms and conditions or (2) fail to require any applicant to adhere to the terms and conditions of the incidental take statement

through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(a)(2) may lapse. To monitor the impact of incidental take, Reclamation (LCR MSCP) must report the progress of the action and its impact on the species to the Arizona Ecological Services Office as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

To provide incidental take coverage, and track when take occurs, we will use the surrogate of habitat destruction and creation. We will measure habitat by acres of marsh and the associated cottonwood-willow defined earlier. The 2005 LCR MSCP documents and 2017 amendment documents clearly identify anticipated impacts to affected species likely to result from the proposed taking and the measures that are necessary and appropriate to minimize those impacts; now including the impacts to the northern Mexican gartersnake. All conservation measures described in the HCP and amendment, together with the terms and conditions described in the associated IA, and the section 10(a)(1)(B) permit or permits issued with respect to the HCP Amendment, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this incidental take statement under 50 CFR 402.14(i). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(a)(2) of the Act to apply. If the permittees fail to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(a)(2) may lapse. The incidental take coverage for the inclusion of the northern Mexican gartersnake in the Conservation Plan becomes effective on the signing of the section 10(a)(1)(B) permit, and the acceptance of this BO by the Federal agencies.

The amount or extent of incidental take of northern Mexican gartersnake is described in Attachment 2 of the amended BA; 1,227 acres of habitat loss. We will consider take to be exceeded if more than 1,227 acres of northern Mexican gartersnake habitat is destroyed. As described earlier in this BO, the presence of the covered species within the LCR MSCP planning area has been documented and there is more than reasonable certainty that individuals of the species are present and would be taken as a result of the covered actions and implementing the Conservation Plan. There are several categories of incidental take included, ranging from that resulting from implementing the Federal and non-Federal covered actions, and implementing the Conservation Plan. In addition to take defined by habitat loss and harassment, there are other categories of take, particularly that due to water operations, which is described in terms of how the take will occur. The Conservation Plan also contains avoidance and minimization measures designed to reduce the amount of direct take that could occur from harm or harassment of individuals during implementation of the covered activities and the Conservation Plan.

EFFECT OF THE TAKE

In this BO, we determined that the level of anticipated take is not likely to result in jeopardy to the northern Mexican gartersnake.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

The mitigation, minimization, avoidance, survey, monitoring, and reporting measures provided in the Conservation Plan are incorporated herein by reference as reasonable and prudent measures and terms and conditions to address incidental take of the covered species. The full

description of reasonable and prudent measures that benefit all species, including the northern Mexican gartersnake, is in Chapter 5 of the 2005 HCP and is incorporated herein by reference. The LCR MSCP has included additional actions that will conserve and mitigate the impacts of program covered activities. These actions are considered conservation measures, and thus included in the action. Therefore, no additional reasonable and prudent measures were identified during this consultation. Reporting requirements to document the implementation of reasonable and prudent measures and terms and conditions are included in the Conservation Plan, the IA, and the section 10(a)(1)(B) permit. As long as those reporting requirements are met, the requirements of this incidental take statement will be met.

Minimization and Mitigation of Incidental Take

The issuance criteria for a section 10(a)(1)(B) permit require that the incidental take resulting from the covered actions be minimized and mitigated to the maximum extent practicable (50 CFR 17.22(b)(2)(B)). The minimization or avoidance measures included in the 2005 Conservation Plan, the IA, or the permit do not encompass all possible measures that would reduce or avoid take. However, the included measures are effective, efficient, and offset the anticipated take from operations and implementation of both covered actions and LCR MSCP projects. It is our conclusion that the Conservation Plan, fully mitigates for the adverse effects of the covered actions that result in incidental take and therefore meets the permit issuance criteria for minimizing and mitigating to the maximum extent practicable. It is important to understand that this determination is based on the amount of incidental take likely to occur in the future from implementing the covered actions (both ongoing and future) and implementing the Conservation Plan. There is no incidental take coverage provided to the effects of past actions that have already been manifested in the environmental baseline that exists at the time of this consultation. Incidental take coverage is only provided for ongoing and future actions as manifested in the physical and biological habitats of the LCR.

We determined that the proposed action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of northern Mexican gartersnakes. All reasonable measures to minimize take have been incorporated into the project description. Thus, no reasonable and prudent measures are included in this incidental take statement.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office (AZESO). Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

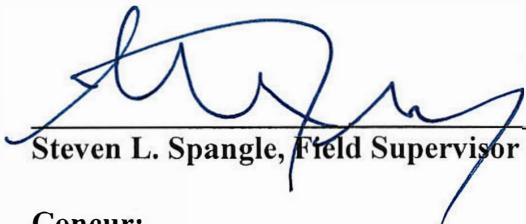
REINITIATION NOTICE

This concludes formal consultation on the action outlined in the Project Description of this Opinion. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of Service's action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in implementing this consultation and, by copy of this BO, are notifying Tribes that have expressed an interest of its completion.

We appreciate the LCR MSCP's efforts to identify and minimize effects to listed species from this project. For further information please contact me or Jessica Gwinn, 602-242-0210. Please refer to the consultation number 22410-2004-F-0161-R, in future correspondence concerning this project.

Approved:


 Steven L. Spangle, Field Supervisor

2/5/18
 Date

Concur:


 Assistant Regional Director
 Ecological Services, Region 2

MAR 5 2018
 Date

Non-concur:

 Assistant Regional Director
 Ecological Services, Region 2

 Date

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